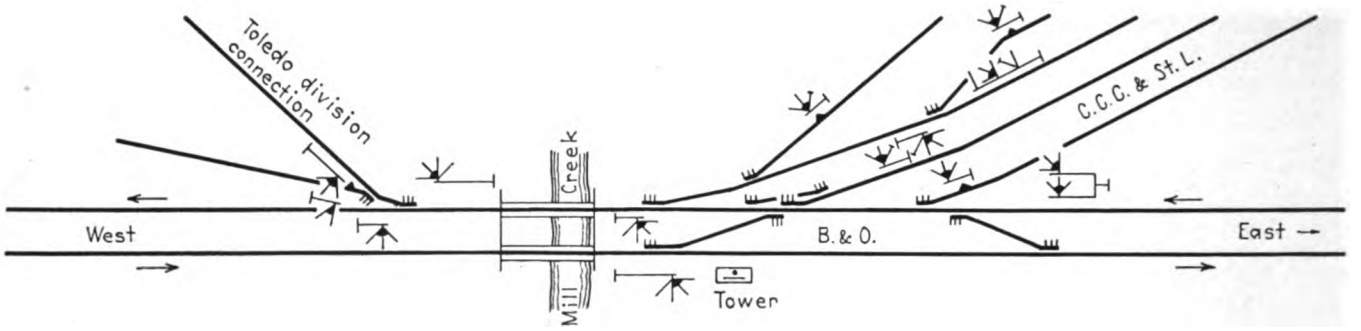
General view of the interlocking showing tower and eastward signals

B. & O. Installs Modern Interlocking

All-electric plant with panel-type control machine, replaces old mechanical interlocking at busy junction

THE Baltimore & Ohio has recently installed a new electric interlocking to replace an old mechanical plant at Ivorydale Junction, 7.4 miles east of Cincinnati Union Station, on the B. & O. main line east toward Washington, D. C. The layout includes a junction with the New York Central System Big Four Route from Cleveland; the N. Y. C. trains using the B. & O. tracks between Ivorydale Junction and Cincinnati. Ivorydale also is a junction with a B. & O. line north to Dayton and Toledo. At other junctions, on the main line a few miles east of Ivorydale Junction, the Pennsylvania and the Norfolk & Western connect with the B. & O., and passenger trains of the Pennsylvania and Norfolk & Western use the B. & O. main tracks through Ivory-

Westward signals showing eastbound Norfolk & Western train



Track and signal plan of Ivorydale interlocking on the Baltimore & Ohio near Cincinnati

dale Junction to and from the Cincinnati Union Station. Thus, the traffic through Ivorydale interlocking is heavy; ranging as high as 250 line-ups in a 24-hour period.

Track Layout

The layout at Ivorydale Junction includes 7 single switches, 1 crossover, 1 single slip-switch with movable-point frog, 6 high home signals and 8 dwarf signals, as shown on the accompanying track and signal plan. The switch machines are the Model 5-C with 110-volt d.c. motors. The signals located on the B. & O. are their standard color-position-light type. Signals located on the N. Y. C. are the conventional doublet color-light type. The control machine has a panel 20 in. high and 56 in. long, with a terminal cabinet below. On the illuminated track diagram are 14 push-pull-turn buttons for controlling signals, and two reminder turn buttons for controlling movements against the direction of traffic. Each switch or crossover is controlled by a small toggle-type lever. These nine levers are in a horizontal row on the panel below the track diagram. Each lever is normally in the lowered position, and is raised to reverse the switch.

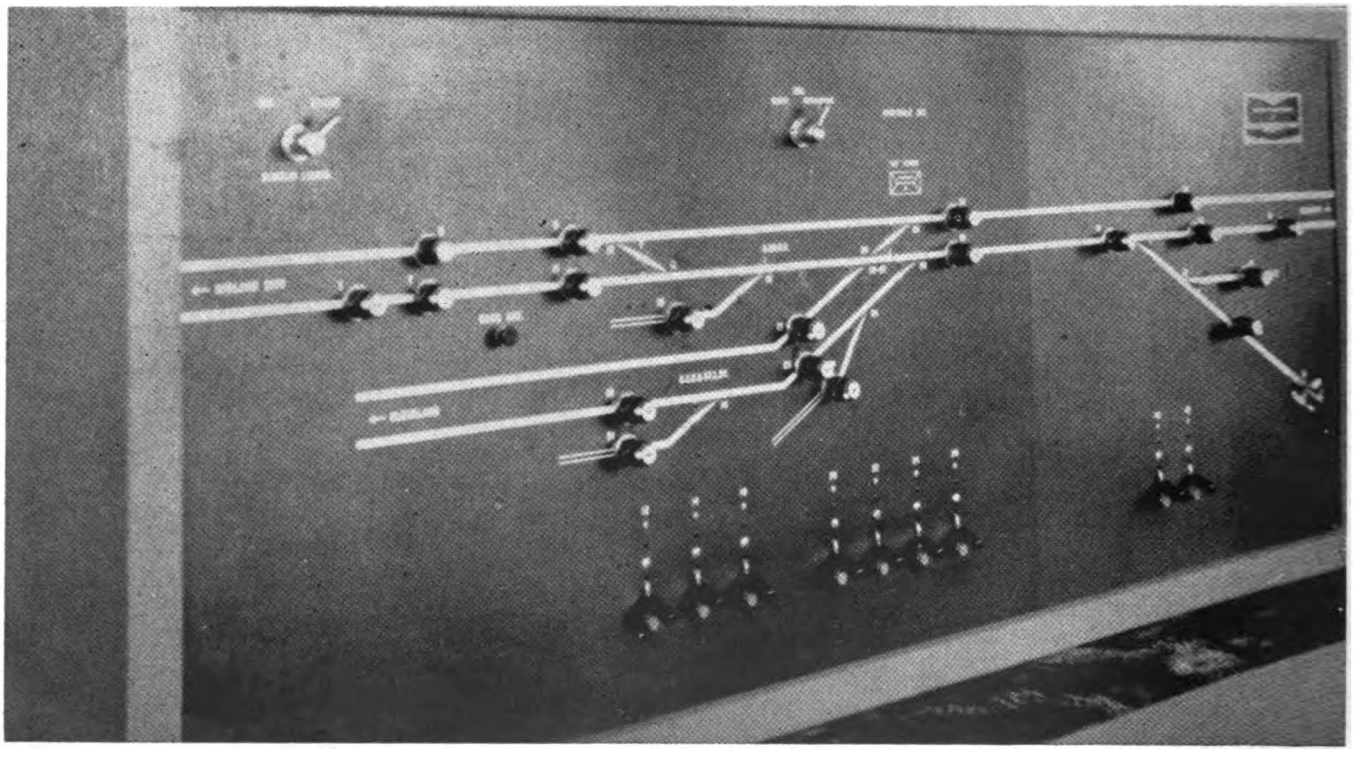
Correspondence Lamp

Immediately above each switch lever, is a small white lamp which is lighted when a switch is out of correspondence with its control lever. Above the white lamp is a red lamp which is lighted when electric locking is in effect to prevent operation of the switch. The circuits render a lever movement ineffective if made when the red light is burning and must be repeated after route locking is released.

In the track diagram, a small movable switch point indicator follows each switch operation, so that the route lined up is indicated by a continuous white line ¼-in. wide. Having lined the switches, the signal for the route is cleared by pushing the button on the diagram at the location corresponding to the signal. When the signal clears, an orange lamp is lighted in the face of the button, outlining a black arrow pointing in the direction which the signal controls. When the train accepts the signal and passes it, the lamp in the button goes out. If a signal which has been cleared is to be taken away, the button is pulled.

Turn Traffic Button

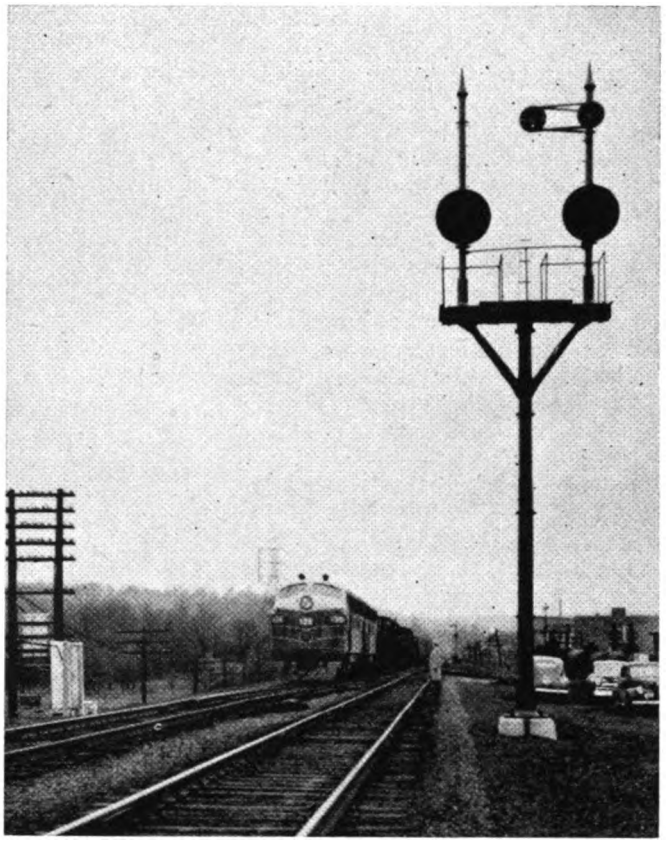
The main lines of the Baltimore & Ohio and the New York Central are double track, with normally right-hand running. In order to establish a route against the current of traffic, it is necessary to turn the traffic-direction button for that track



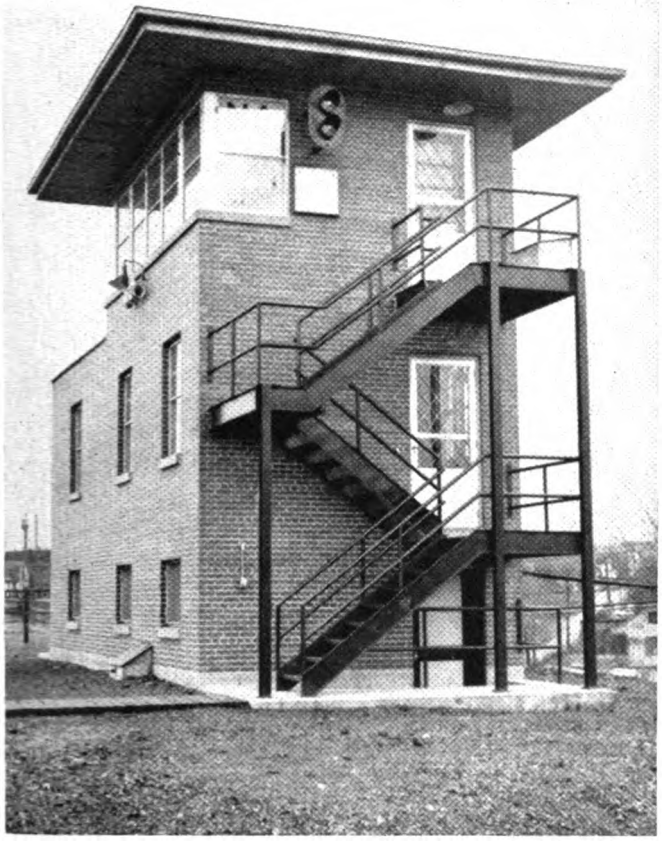
The panel of the interlocking machine has levers for control of switches and buttons for control of signals

a half revolution. These buttons are on the lines representing their respective tracks, and are in approach to the button governing the home signal for the track to be entered. Traffic-direction buttons include no indication lamps.

The old Federal mechanical interlocking which had been in service since 1912, included 33 switch and/or lock levers and 24 signal levers. The entire plant, including the old frame tower, was removed.



The signals are the Baltimore & Ohio color-position light type



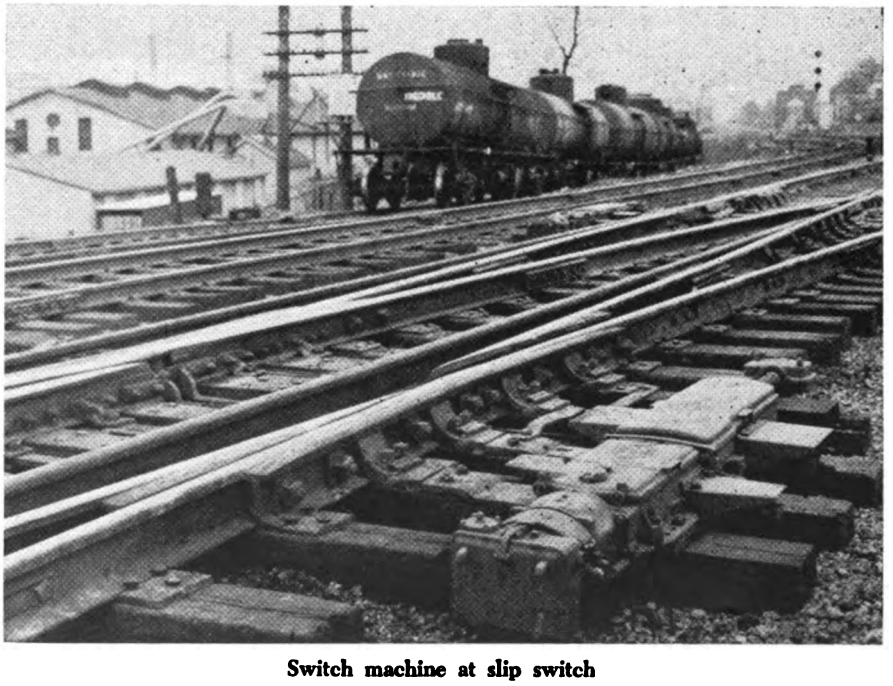
The tower is of fire-proof construction throughout, including doors, and stairways

Changed-Over Quickly

With the large number of movements through this interlocking daily, serious delays would have resulted if the interlocking had been out of service for an extended period. By careful planning, the new electric interlocking was constructed and tested out ready for service, while the old mechanical plant was still in operation. The change-over was accomplished in a few hours between rush periods.

Considerable temporary work was required to keep the mechanical plant in service during construction of the electric interlocking. At each switch, extra long ties were installed to permit the mechanical operating pipe connections, cranks, facing-point locks and switch circuit controllers to be moved further than standard distance from the track. Extra long operating rods were installed as required. This was done to provide space so that the new electric switch machines could be installed permanently in their proper places.

The operating lock and point-detector bars on each switch machine were connected together by means of a test bar to permit principal ad-

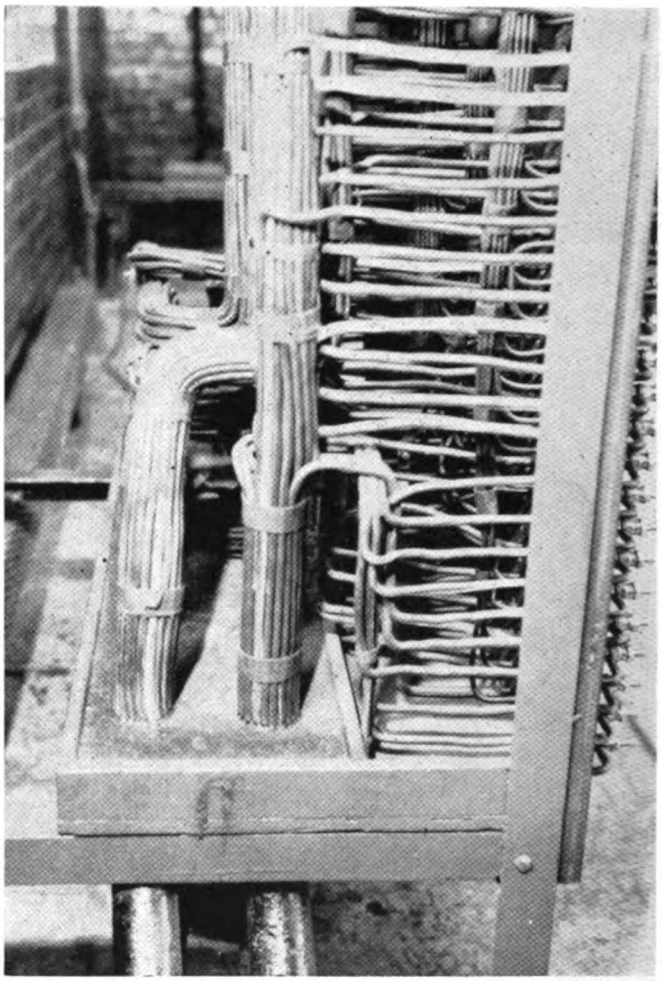


Switch machine at slip switch

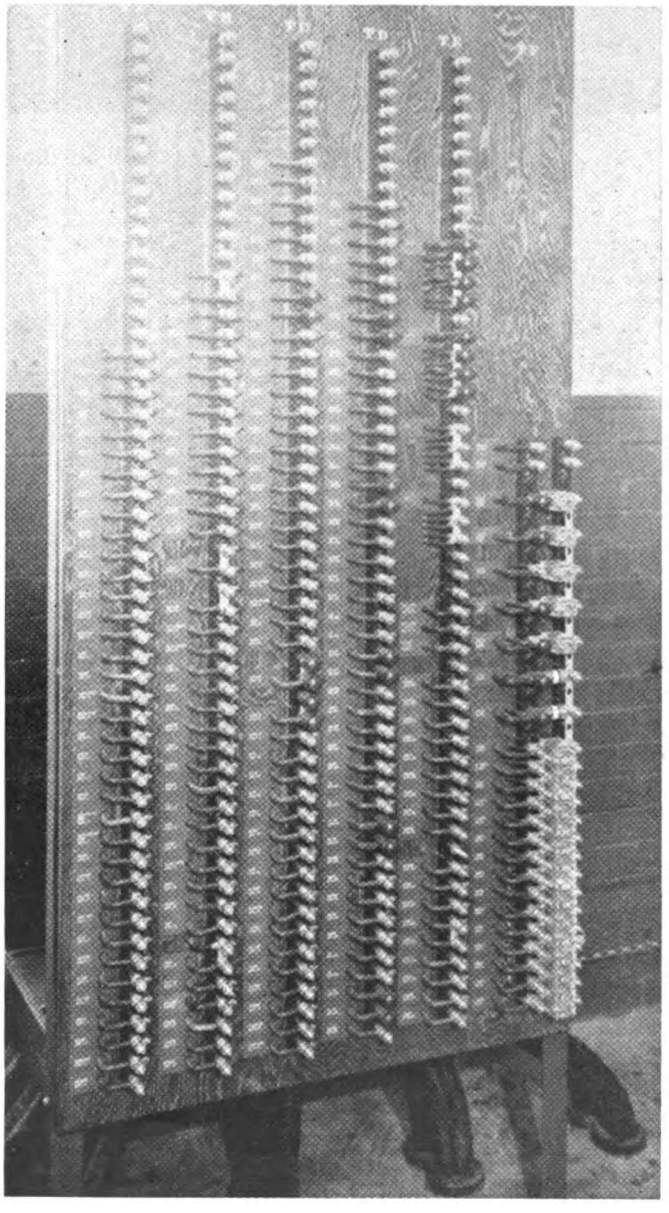
justments and tests being made before the rods were connected to the switch points. Choosing a time between trains for the change-over, only a few minutes were required to disconnect the pipe line connections, and connect the rods to the switch machine. Thus, the control of each switch was changed from the mechanical to electric operation. While one group of men made these changes at the switches, another removed the blades from the semaphore signals, and installed lamps in the new light signals. In a few instances, the new signals could not be installed until the old ones were removed. Nevertheless, the change-over was made with very little interruption to train movements.

Because of close track centers, space was not available adjacent to one of the single slip-switches for a switch machine, and it was necessary to locate it outside of an adjoining track which required special ties 30 ft. long. The throw rod and lock rods are 1¼ in. solid rods about 17 ft. 6 in. long, supported on roller carriers.

The new tower, illustrated in one of the pictures herewith, is constructed of concrete, brick and metal. The window sash and door frames, including screen door frames, are aluminum. The objective sought was to make the building fire proof and minimize maintenance costs. Underground cables enter the tower through an enclosed entrance located on the track side below the ground line. These cables extend up through the floor and terminate on multiple terminal blocks mounted on a board 3 ft. wide and 8 ft. high. At the rear of the board, the outer protective covering of the cables is potheaded in a box filled with sealing compound, as shown in one of the pictures.



Cable pothead in the box at the rear of board



The incoming wires terminate on board in the tower

At outdoor relay cases, each cable is brought up from below ground in a 2-in. galvanized pipe riser, and sealed with compound. The 110-volt switch machines are operated by 55 cells of 80-a.h. Gould storage battery. The control circuits are fed by three 80-a.h. Exide batteries of 6 cells each. Each track circuit is fed by one 120-a.h. lead storage cell.

The new interlocking was planned and installed by Baltimore & Ohio signal forces, the principal items of interlocking equipment being furnished by the General Railway Signal Company.